La Rochelle Université

MIA
MATHÉMATIQUES IMAGE APPLICATIONS
UNIVERSITÉ DE LA ROCHELLE

Applied geometry / Partial differential equations
Computer vision / Deep learning algorithms
Mathematical engineering

# Mathématiques, Image et Applications (MIA)

**The scientific activity of the MIA covers both classical theoretical issues for a mathematics laboratory and applicative issues arising from major societal challenges.**

**The laboratory's two areas of excellence, image, video and data processing and analysis and human-scale environmental modelling, closely combine multidisciplinary skills**
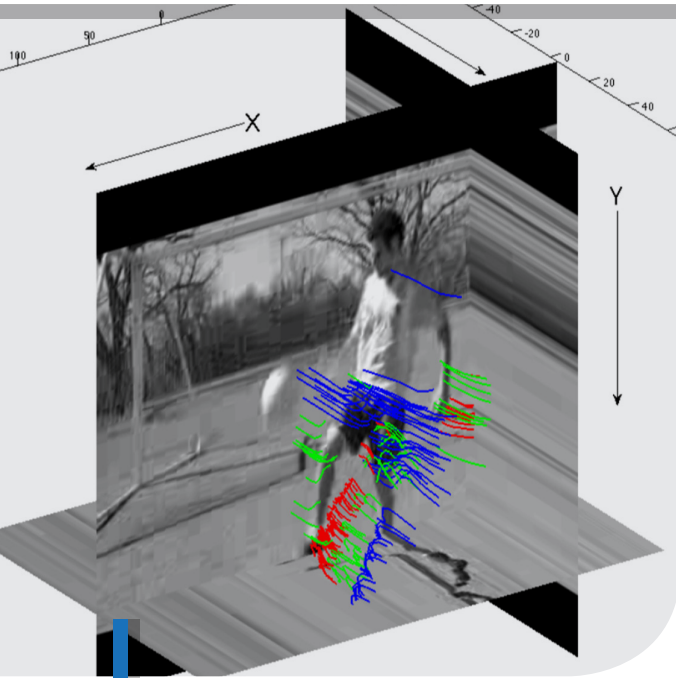


Director — **Catherine Choquet**

Permanent research staff — **15**

Phd student — **10**

Staff on research project — **5**

— **2 teams**

▸ Mathematics and Image
▸ Mathematics Environment, Health and Life Sciences

Discipline — **Mathematics**

## Societal challenges

### Applied Mathematics

The potential of mathematics as a language of innovation and as a creator of technological added value for the industry is constantly being reaffirmed. Many actors in private companies or services use the MIA's expertise for the development of original models, for numerical simulations and for the creation of new artificial intelligence algorithms. MIA Lab offers solutions for decision support, risk management or process optimization.

### Modeling

Considering the reality of data to provide usable answers, whether when modelling physical, biological, economic processes or environmental interactions. Mathematical modelling integrates the processes of information acquisition and restitution.

### Environment and health

Development of predictive solutions in fields as varied as meteorology, economics, water resource management, micro-magnetism, medical diagnosis.

### Imaging

The MIA is known for its expertise in image processing, especially for its ability to provide information retrieval algorithms and classification.

# Research Network

At the regional level, the MIA is a founding member of the CNRS research federation «Mathematics and Interactions, Image and Digital Information, Networks and Security» (MIRES) and the Aquitaine networks of excellence «Photonics and Microwaves Competitiveness Cluster», «Anticipation of Climate Change», «Onco-sphere».

At the national level, the Laboratory is part of several CNRS Research Groups.

The MIA also works closely with Labex AMIES.

At the international level, the MIA is certified ITEA Pathology 3D and DIATOMIC H2020 competence center. La Rochelle Université is recognized by the Shanghai ranking for its research in mathematics

# Expertise Achievements

MIA signed a contract with Universal Pictures studios to operate a continuous film restoration software developed at the Laboratory.

A world first, an algorithm for real-time and 3D segmentation of cancerous tumors in high-frequency ultrasound images, was developed at the MIA.

The MIA creates new numerical simulation tools adapted to the small scales of human physiology as well as the large scales of climate change.

The MIA also collaborates with SMEs to develop new image analysis algorithms based on original theoretical results.
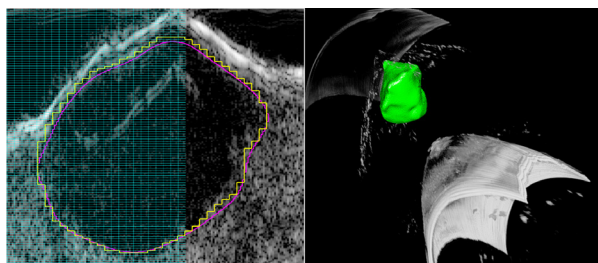
# Training

## MASTER **MATHEMATICS AND APPLICATIONS**

▶ **course Mathematics and interactions, MIX**

# Partnerships Collaborations

MIA is involved in numerous industry partnerships and in start-up creations. It is collaborating with a dozen foreign universities all around the world, with national public institutions (including the National Audiovisual Institute, Météo France) and local authorities.

The Lab is also regularly associated with the work of French research institutes (including the CNRS, INRIA, INRA, CEA and INSERM) and regional research centers.

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# CONTACT
**Mathématiques
Image et Applications**

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Université**